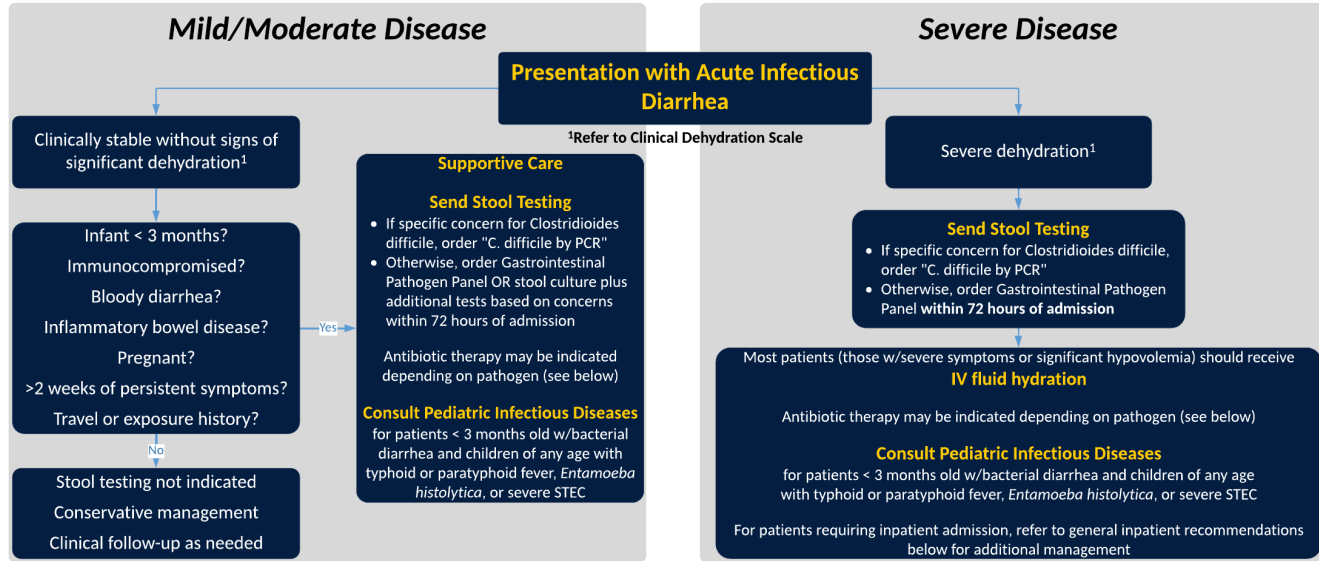


GUIDELINES FOR TREATMENT OF ACUTE INFECTIOUS DIARRHEA IN PEDIATRIC PATIENTS



¹Determining Severity of Dehydration

Volume deficit (Infant)	5% (50 mL/kg)	10% (100 mL/kg)	15% (150 mL/kg)
Volume deficit (Older Child)	3% (30 mL/kg)	6% (60 mL/kg)	9% (90 mL/kg)
Dehydration Classification	Mild	Moderate	Severe
Mental status	Alert		Lethargic/obtunded
Fontanelle	Flat	Soft	Sunken
Eyes	Normal	Deep set	Sunken
Tears	Present	Reduced	None
Buccal mucosa/lips	Dry	Dry	Parched/cracked
Pulse rate	Normal	Slightly increased	Increased
Skin (touch)	Normal	Dry	Clammy
Skin turgor	Normal	Tenting	None
Capillary refill	Normal	~2-3 seconds	>3 seconds
Pulse quality	Normal	Weak	Feeble/impalpable
Urine output	Normal/mild oliguria	Mild oliguria	Severe oliguria



[Table of Contents](#)

General Outpatient Recommendations	General Inpatient Recommendations	¹Determining Severity of Dehydration
Campylobacter	Plesiomonas	Nontyphoidal Salmonella (NTS)
Salmonella enterica, Typhi, or Paratyphi	Shigella	Vibrio
Yersinia enterocolitica	Shiga toxin producing E. coli (STEC)	Enteropathogenic E. coli (EPEC) & Enterotoxigenic E. coli (ETEC)
Enteroaggregative E. coli (EAEC)	Giardia	Cryptosporidium
Cyclospora	Entamoeba histolytica	Viruses

**Please note this guideline does NOT include recommendations for Clostridioides (formerly Clostridium) difficile - see dedicated internal guideline for further details: [Clostridioides difficile Infection in Adults and Children](#) and [Pediatric C. difficile Cheat Sheet](#).*

Commented [EL1]: Add Plesiomonas to table

General Outpatient Recommendations:

- **Supportive care**, including oral rehydration, recommended for all patients
- **Stool Testing** may be indicated in certain scenarios
 - o If there is specific concern for *Clostridioides difficile* in a child > 12 months old, order “*C. difficile* by PCR” ONLY
 - o Consider ordering stool culture or “Gastrointestinal Pathogen Panel” (GI panel), depending on insurance, in the following scenarios:
 - Infant < 3 months
 - Immunocompromised host
 - Bloody diarrhea
 - Inflammatory bowel disease
 - Pregnant patient
 - > 2 weeks of persistent symptoms
 - Travel or exposure history
 - o If sending stool culture, consider additional tests for viruses (rotavirus, norovirus, etc.) or parasites (Giardia, Cryptosporidium) as clinically indicated
 - o If there is specific concern for diarrhea due to *Aeromonas* (due to ingestion of fresh or brackish water, or potentially contaminated food – especially shellfish), stool culture is needed
 - o If there is specific concern for other parasites (such as worms), order “Ova and Parasite Screen”
- **Diet**
 - o Once patient is rehydrated, goal should be to return to age-appropriate, unrestricted diet
 - o Do not use the BRAT (bread/banana, rice, applesauce, toast) diet or other restrictive or progressive diets
 - o Avoid use of fruit juices and carbonated sodas
 - o If a patient has previously breastfed, continue to breastfeed
 - o For prolonged/severe symptoms, consider eliminating lactose (or having breast-feeding mother eliminate lactose) until symptoms improve; if the patient is predominantly formula fed, use a lactose free formula until symptoms improve
- **Antimicrobials**
 - o Empiric antibiotics (e.g., those given before stool testing results) are not recommended for children with mild to moderate symptoms who are appropriate for outpatient management
 - Bloody stools alone are not necessarily an indication for empiric antibiotics
 - o Targeted antibiotics (e.g., those given after a pathogen is identified) may be warranted depending upon the pathogen and other clinical features - see [Table 1](#) below for pathogen-specific guidance
 - o Obtain a blood culture prior to starting antibiotics in the following settings:
 - Infants < 3 months
 - Documented *Salmonella* or concern for typhoid/paratyphoid fever (*Salmonella typhi* or *paratyphi*)
- **Pediatric Infectious Diseases (ID) Consult**
 - o Discussion with Pediatric ID is recommended, at a minimum, in the following situations:
 - Infants < 3 months with confirmed or highly suspected bacterial diarrhea
 - Severe cases of STEC, if antibiotic treatment is desired

- All cases of *Salmonella typhi* or *paratyphi* (typhoid or paratyphoid fever)
- All cases of symptomatic *Entamoeba histolytica*
- As needed to discuss management of other pathogens (e.g., *Aeromonas* isolated from stool culture)
- **Symptomatic Therapy**
 - Anti-motility agents such as loperamide are not recommended for use in children with infectious diarrhea
 - Antiemetic agents such as ondansetron can be considered on an individual basis if patient is having multiple episodes of emesis; this may reduce hospital admissions
 - Use has been associated with QT prolongation; Consider EKG in patient with underlying risk, or on multiple QT prolonging medications
 - Probiotics, specifically *Lactobacillus*, may be considered in patients without immunocompromise or central lines, as this may reduce frequency and duration of diarrhea

General Inpatient Recommendations:

- **Clinical Indications for inpatient management** (may include, but are not limited to):
 - Intractable emesis, poor tolerance or refusal of oral rehydration solutions (ORS)
 - Severe dehydration (see [table](#)) or vital sign instability, despite ED hydration protocol
 - Young age (< 1 year) with irritability, lethargy, or an uncertain diagnosis that may require close observation
 - Underlying illness that may complicate course of disease
 - ORS treatment failure, including worsening of diarrhea and dehydration despite appropriate administration of ORS
 - Concerns regarding adequate care at home by caretakers
- **Sepsis with organ dysfunction or septic shock**
 - Patients with sepsis with organ dysfunction or septic shock should be managed as per institutional guidelines for [Identification and Management of Sepsis](#) and [Empiric Antibiotic Guidelines for Undifferentiated Sepsis with Organ Dysfunction or Shock in Patients on Pediatric Services \(excluding NICU\)](#).
- **Stool testing** should be performed on all patients admitted for acute diarrhea
 - If there is specific concern for *Clostridioides difficile* in a child > 12 months old, order “*C. difficile* by PCR ONLY
 - Otherwise, order “Gastrointestinal Pathogen Panel” (GI panel) **within 72 hours of admission**
 - If diarrhea develops during a hospital admission, it is likely to be either non-infectious, or due to *C. difficile*; it is unlikely a patient would acquire other infectious pathogens during a hospital stay unless there is a specific exposure (e.g., norovirus outbreak)
 - If there is specific concern for diarrhea due to *Aeromonas* (due to ingestion of fresh or brackish water, or potentially contaminated food – especially shellfish), stool culture is needed
 - If there is specific concern for parasites that are NOT on the GI panel (such as worms), order “Ova and Parasite Screen”
- **Isolation/Precautions** may be needed based on pathogen and patient factors; refer to [Infection Prevention & Epidemiology](#)
- **Intravenous Fluids**
 - If patient meets criteria for severe dehydration, or has failed ORT, isotonic intravenous fluids such as lactated Ringer’s or normal saline (NS) solution should be administered
 - Serum electrolytes, bicarbonate, urea nitrogen, creatinine, and glucose levels (BMP) should be obtained at least on admission and repeated as needed
 - Start with a NS bolus 20 mL/kg and consider further boluses as needed; alternative fluids for bolus (e.g. D5NS) can be considered in consultation with a fellow or attending physician
 - If patient is found to be hypoglycemic, hyponatremic, or hypernatremic, correct with appropriate fluids accordingly
 - Intravenous rehydration should be continued until pulse, perfusion, and mental status normalize, the patient awakens, and no risk factors for aspiration, and no evidence of ileus
 - Therapy may then be switched to an oral or NG route
 - Once patient is rehydrated, maintenance fluids should be administered (can be done via oral or NG route) and ongoing losses should be replaced, until diarrhea and vomiting are resolved
 - Replace GI losses with 1:1 normal saline every 4 hours
 - See [Maintenance Intravenous Fluid \(MIVF\) Algorithm](#) for additional details
 - If patient on a diuretic, consider holding in conjunction with relevant specialist (such as cardiology, nephrology)
 - Strict I/O’s must be maintained
- **Diet**
 - Once patient is rehydrated, goal should be to return to age-appropriate, unrestricted diet
 - Do not use the BRAT (bread/banana, rice, applesauce, toast) diet or other restrictive or progressive diets
 - Avoid use of fruit juices and carbonated sodas



[Table of Contents](#)

- If a patient has previously breastfed, continue to breastfeed
- Consider eliminating lactose (or having breast-feeding mother eliminate lactose) until symptoms improve; if the patient is predominantly formula fed, use a lactose free formula until symptoms improve
- **Antimicrobials**
 - Antimicrobials are recommended for some children with symptoms significant enough to be admitted, depending on the pathogen – see Table 1 below for pathogen-specific guidance
 - Obtain blood cultures prior to starting antibiotics for patients in the following settings:
 - Infants < 3 months
 - Sepsis (see [Identification and Management of Sepsis](#))
 - Documented *Salmonella* or concern for typhoid/paratyphoid fever
- **Pediatric Infectious Diseases (ID) Consult**
 - Pediatric ID consult is recommended, at a minimum, in the following situations:
 - Infants < 3 months with confirmed or highly suspected bacterial diarrhea
 - Bacteremia or invasive disease
 - Severe cases of STEC, if antibiotic treatment is desired
 - All cases of *Salmonella typhi* or *paratyphi* (typhoid or paratyphoid fever)
 - All cases of symptomatic *Entamoeba histolytica*
 - As needed to discuss management of other pathogens (e.g., *Aeromonas* isolated from stool culture)
- **Symptomatic Therapy**
 - Anti-motility agents such as loperamide (Imodium) are not recommended for use in children with infectious diarrhea
 - Antiemetic agents such as ondansetron (Zofran) can be considered on an individual basis if patient is having multiple episodes of emesis
 - Use has been associated with QT prolongation; Consider EKG in patient with underlying risk, or on multiple QT prolonging medications
 - Probiotics, specifically *Lactobacillus*, may be considered in patients without immunocompromise or central lines, as this may reduce frequency and duration of diarrhea
- **Discharge Criteria**
 - Vital signs within normal limits for age
 - PO intake > losses
 - Urine output > 1 mL/kg/hr
 - Improving frequency of diarrhea

Table 1. Antimicrobial recommendations for specific infectious pathogens.

Pathogen/ Infectious Agent	Outpatient Management	Inpatient Management	Comments
Bacteria			
<p><i>Campylobacter</i></p> <p><u>Exposures:</u> Poultry Unpasteurized milk and dairy</p> <p><u>Season:</u> Spring/Summer</p>	<p><u>Uncomplicated:</u></p> <ul style="list-style-type: none"> No antibiotics recommended unless indications present <p><u>Indications for further evaluation/antibiotics:</u></p> <ul style="list-style-type: none"> Prolonged or severe disease Immunocompromised <p><u>Preferred:</u> Azithromycin 10 mg/kg/DOSE PO daily (max: 500 mg/DOSE)</p> <p><u>Alternative, for macrolide allergy:</u> Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/dose)</p>	<p>Antibiotics are recommended for <u>ALL</u> patients requiring admission for <i>Campylobacter</i> infection.</p> <p><u>Uncomplicated</u> <u>Preferred:</u> Azithromycin 10 mg/kg/DOSE PO daily (max: 500 mg/DOSE)</p> <p><u>Alternative, for macrolide allergy:</u> Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/DOSE)</p> <p><u>If concern for bacteremia or invasive disease</u> <u>Preferred, pending blood culture results:</u> Meropenem* 20 mg/kg/DOSE IV q8h (max: 1 g/DOSE)</p>	<p><u>Duration:</u></p> <ul style="list-style-type: none"> Azithromycin: 3 days Ciprofloxacin: 3-5 days Bacteremia: 7-14 days, in conjunction with ID consult recommendations – may be able to step down to azithromycin or ciprofloxacin <p>Pediatric Infectious Diseases consult is recommended for bacteremia or evidence of invasive infection.</p> <p>National Antimicrobial Resistance Monitoring System for Enteric Bacteria (NARMS) preliminary data from 2022 shows that 30% of isolates are quinolone resistant whereas only 1-2% are resistant to azithromycin.</p> <p><i>If desired, residual sample from GI panel can be sent to Mayo for susceptibility testing at team's request.</i></p>
<p>Nontyphoidal <i>Salmonella</i> (NTS)</p> <p><u>Exposures:</u> Contaminated food Live poultry Reptile contact</p> <p><u>Season:</u> Summer/Fall</p>	<p><u>Uncomplicated:</u></p> <ul style="list-style-type: none"> No antibiotics recommended unless indications present <p><u>Indications for further evaluation/antibiotics:</u></p> <ul style="list-style-type: none"> Severe diarrhea (9-10 stools/day) High or persistent fever Infants <3 months Immunocompromised Chronic gastrointestinal tract disease Malignant neoplasms Hemoglobinopathies including Sickle cell disease <p><i>A blood culture should be obtained prior to starting antibiotic therapy, even for outpatients.</i></p> <p><u>Preferred:</u> Azithromycin 10 mg/kg/DOSE PO daily (max: 500 mg/DOSE)</p> <p><u>Alternative, if macrolide allergy:</u> Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/dose)</p> <p><u>Additional alternatives, if susceptible:</u> Amoxicillin* 16.7 mg/kg/DOSE PO TID (max: 500 mg/DOSE) OR TMP-SMX* 4 mg/kg/DOSE PO BID (max: 320 mg/DOSE)</p>	<p>A blood culture and antibiotics are recommended for <u>ALL</u> patients requiring admission for NTS infection.</p> <p><u>Empiric</u> <u>Preferred, pending blood culture results:</u> Ceftriaxone 100 mg/kg IV once, then 50 mg/kg/DOSE IV q12h (max: 2 g/DOSE)</p> <p><u>Oral step-down (if no bacteremia, or once bacteremia cleared)</u> <u>Preferred:</u> Azithromycin 10 mg/kg/DOSE PO daily (max: 500 mg/DOSE)</p> <p><u>Alternative, if macrolide allergy:</u> Ciprofloxacin 15 mg/kg/DOSE PO BID (max: 500 mg/DOSE)</p> <p><u>Additional alternatives, only if no bacteremia and, if susceptible:</u> Amoxicillin* 16.7 mg/kg/DOSE PO TID (max: 500 mg/DOSE) OR TMP-SMX* 4 mg/kg/DOSE PO BID (max: 320 mg/DOSE)</p>	<p><u>Duration:</u></p> <ul style="list-style-type: none"> No bacteremia: 5 days Bacteremia: 7-10 days, in conjunction with ID consult recommendations <p>Pediatric Infectious Diseases consult is recommended for patients with bacteremia or evidence of invasive infection.</p> <p><i>A positive GI panel result for Salmonella will reflex to stool culture with susceptibilities.</i></p> <p>Disseminated disease (meningitis, osteoarticular infection, endocarditis) should be excluded in patients with NTS bacteremia.</p>

Pathogen/ Infectious Agent	Outpatient Management	Inpatient Management	Comments
<p><i>Salmonella enterica, typhi</i> or <i>paratyphi</i></p> <p><u>Exposures:</u> Travel to Southern Asia (India, Pakistan, Bangladesh), Africa, SE Asia</p> <p><u>Season:</u> Travel during monsoon season in endemic areas increases risk, but present year-round</p>	<p><i>A blood culture and antibiotics are recommended for all patients with Salmonella typhi or paratyphi infection.</i></p> <p><u>Preferred:</u> Azithromycin 10 mg/kg/DOSE PO daily (max: 500 mg/DOSE)</p> <p><u>Alternative, if macrolide allergy:</u> Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/dose)</p> <p><u>Additional alternatives, if susceptible:</u> Amoxicillin* 16.7 mg/kg/DOSE PO TID (max: 500 mg/DOSE) OR TMP-SMX* 4 mg/kg/DOSE PO BID (max: 320 mg/DOSE)</p>	<p>A blood culture and antibiotics recommended for <u>ALL</u> patients with <i>Salmonella typhi</i> or <i>paratyphi</i> infection.</p> <p><i>Empiric, pending blood cultures:</i> Ceftriaxone 100 mg/kg IV once, then 50 mg/kg/DOSE IV q12h (max: 2 g/DOSE)</p> <p>Consider empiric meropenem if recent travel to areas with XDR <i>Salmonella typhi</i> (such as Pakistan)</p> <p><u>Oral step-down (if no bacteremia, or once bacteremia cleared):</u> <i>Preferred:</i> Azithromycin 10 mg/kg/DOSE PO daily (max: 500 mg/DOSE)</p> <p><i>Alternative, if macrolide allergy:</i> Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/dose)</p> <p><i>Additional alternatives, if susceptible:</i> Amoxicillin* 16.7 mg/kg/DOSE PO TID (max: 500 mg/DOSE) OR TMP-SMX* 4 mg/kg/DOSE PO BID (max: 320 mg/DOSE)</p>	<p><u>Duration:</u></p> <ul style="list-style-type: none"> - 7-14 days, in conjunction with ID consult recommendations - 14 days is recommended if using amoxicillin or TMP-SMX; discuss dosing with ID pharmacist if bacteremia is present. <p>Pediatric Infectious Diseases consult is recommended for <u>ALL</u> patients (including outpatients).</p> <p><i>A positive GI panel result for Salmonella will reflex to stool culture with susceptibilities.</i></p> <p><u>Region-specific recommendations:</u> Resistance varies globally; check CDC for guidance based on a specific travel history.</p> <p>Per AAP Red Book, relapse rates appear to be lower in those treated with azithromycin than with fluoroquinolones or ceftriaxone. Likewise, National Antimicrobial Resistance Monitoring System for Enteric Bacteria (NARMS) preliminary data from 2020-2023 shows increasing resistance to both ceftriaxone and ciprofloxacin. Can cause bacteremia (enteric/typhoid fever) with symptoms of headache, lethargy, malaise, abdominal pain, diarrhea.</p>

Pathogen/ Infectious Agent	Outpatient Management	Inpatient Management	Comments
<p><i>Shigella</i></p> <p><u>Exposures:</u> Egg salad Lettuce Day care MSM</p> <p><u>Season:</u> No specific season</p>	<p><u>Uncomplicated:</u></p> <ul style="list-style-type: none"> No antibiotics recommended unless indications present <p><u>Indications for further evaluation/antibiotics:</u></p> <ul style="list-style-type: none"> Immunocompromised Severe disease Public health concerns: Children who attend daycare, live in institutions, or are involved in food handling <p><u>Preferred:</u></p> <p>Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/dose)</p> <p><u>Alternative:</u></p> <p>Azithromycin 10 mg/kg/DOSE PO daily (max: 500 mg/DOSE)</p> <p><u>Alternative, only if confirmed susceptible:</u></p> <p>TMP-SMX* 4 mg/kg/DOSE PO BID (max: 320 mg/DOSE)</p>	<p>Antibiotics recommended for <u>ALL</u> patients requiring admission for <i>Shigella</i>.</p> <p><u>Empiric</u></p> <p>Ceftriaxone 100 mg/kg IV once, then 50 mg/kg/DOSE IV q12h (max: 2 g/DOSE)</p> <p><u>Oral step-down</u></p> <p><u>Preferred:</u></p> <p>Ciprofloxacin** 15 mg/kg/DOSE PO BID (max: 500 mg/dose)</p> <p><u>Alternative:</u></p> <p>Azithromycin 10 mg/kg/DOSE PO daily (max: 500 mg/DOSE)</p> <p><u>Alternative, only if confirmed susceptible:</u></p> <p>TMP-SMX* 4 mg/kg/DOSE PO BID (max: 320 mg/DOSE)</p>	<p><u>Duration:</u></p> <ul style="list-style-type: none"> Azithromycin: 3 days Ciprofloxacin: 3 days TMP-SMX: 5 days Sepsis/bacteremia/invasive disease: 7-14 days, in conjunction with ID consult; if using TMP-SMX, discuss dosing with ID pharmacist if bacteremia is present. <p>Pediatric Infectious Diseases consult is recommended for patients with bacteremia or evidence of invasive infection.</p> <p><i>A positive GI panel result for Shigella will reflex to stool culture with susceptibilities.</i></p> <p>Azithromycin resistance is possible and susceptibility testing is not routinely performed. Do not use for severe disease. If no improvement after 48-72 hours, consider alternative agent.</p> <p>*Fluoroquinolones should be avoided if ciprofloxacin MIC is 0.12 ug/mL or higher, even if labeled as susceptible.</p> <p><i>Shigella dysenteriae</i> type 1 may produce Shiga toxin and can cause HUS.</p>
<p><i>Vibrio vulnificus</i> or <i>Vibrio parahaemolyticus</i></p>	<p><u>Uncomplicated:</u></p> <ul style="list-style-type: none"> No antibiotics recommended unless indications present <p><u>Indications for further evaluation/antibiotics:</u></p> <ul style="list-style-type: none"> Severe diarrhea Invasive/wound infection Sepsis <p><u>Preferred:</u></p> <p>Doxycycline* 2.2 mg/kg/DOSE PO BID (max: 100 mg/DOSE)</p> <p><u>Alternative, if doxycycline allergy:</u></p> <p>Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/DOSE)</p>	<p>Antibiotics recommended for <u>ALL</u> patients requiring admission for <i>Vibrio</i> infection.</p> <p><u>Uncomplicated:</u></p> <p><u>Preferred:</u></p> <p>Doxycycline* 2.2 mg/kg/DOSE PO BID (max: 100 mg/DOSE)</p> <p><u>Alternative, if doxycycline allergy:</u></p> <p>Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/DOSE)</p> <p><u>Bacteremia or invasive disease:</u></p> <p>Ceftriaxone 100 mg/kg IV once, then 50 mg/kg/DOSE IV q12h (max: 2 g/DOSE) + doxycycline* OR ciprofloxacin as above</p>	<p><u>Duration:</u></p> <ul style="list-style-type: none"> Doxycycline: 5 days Ciprofloxacin: 5 days Bacteremia/invasive disease: minimum 7 days, in conjunction with ID consult <p>Pediatric Infectious Diseases consult is recommended for patients with sepsis, bacteremia, or evidence of invasive infection.</p> <p><i>If desired, residual sample from GI panel can be sent to Mayo for susceptibility testing at team's request.</i></p> <p>If <i>Vibrio</i> wound infection present, early surgical consult for debridement of necrotic tissue is indicated.</p> <p>*Doxycycline can be used for short durations (21 days or less) without regard to patient age.</p>

Pathogen/ Infectious Agent	Outpatient Management	Inpatient Management	Comments
<i>Yersinia enterocolitica</i>	<p>Supportive care, including oral rehydration, recommended for all patients.</p> <p>Uncomplicated:</p> <ul style="list-style-type: none"> No antibiotics recommended unless indications present <p>Indications for further evaluation/antibiotics:</p> <ul style="list-style-type: none"> Infants <3 months Immunocompromised Severe disease/sepsis Extraintestinal disease <p>Preferred:</p> <p>TMP-SMX* 4 mg/kg/DOSE PO BID (max: 320 mg/DOSE) OR Doxycycline# 2.2 mg/kg/DOSE PO BID (max: 100 mg/DOSE) OR Ciprofloxacin 15 mg/kg/DOSE PO BID (max: 500 mg/DOSE)</p>	<p>Antibiotics recommended for <u>ALL</u> patients requiring admission for <i>Yersinia</i>.</p> <p>Initial therapy:</p> <p>Ceftriaxone 100 mg/kg IV once, then 50 mg/kg/DOSE IV q12h (max: 2 g/DOSE)</p> <p>Oral step-down, if susceptible:</p> <p>TMP-SMX* 4 mg/kg/DOSE PO BID (max: 320 mg/DOSE) OR Doxycycline# 2.2 mg/kg/DOSE PO BID (max: 100 mg/DOSE) OR Ciprofloxacin 15 mg/kg/DOSE PO BID (max: 500 mg/DOSE)</p>	<p>Duration:</p> <ul style="list-style-type: none"> Without bacteremia: 5 days With bacteremia: 21 days or in conjunction with ID consult (no clear duration recommended; literature is primarily from case series); if using TMP-SMX, discuss dosing with ID pharmacist if bacteremia is present. <p>Pediatric Infectious Diseases consult is recommended for patients with bacteremia or evidence of invasive infection.</p> <p><i>If desired, residual sample from GI panel can be sent to Mayo for susceptibility testing at team's request.</i></p> <p>Antimicrobial therapy decreases the duration of fecal shedding of <i>Yersinia</i>.</p> <p>#Doxycycline can be used for short durations (21 days or less) without regard to patient age.</p>
Shiga Toxin Producing <i>E. coli</i> (STEC)	<p>Antimicrobials should generally be avoided given the risk of inducing hemolytic uremic syndrome.</p> <p>Consult Pediatric Infectious Diseases to discuss starting antibiotics if patient has severe disease. If antibiotics indicated, recommendations for STEC mirror those listed for other <i>E. coli</i> subtypes below.</p>		<p>Pediatric Infectious Diseases consult is recommended for patients with bacteremia or evidence of invasive infection.</p> <p>Laboratory monitoring (including CBC, BUN/Cr) is recommended to screen for hemolytic uremic syndrome. If patients have no evidence of hemolysis, thrombocytopenia, or nephropathy 3 days after diarrhea resolves, HUS is unlikely.</p>
Enteropathogenic <i>E. coli</i> (EPEC) & Enterotoxigenic <i>E. coli</i> (ETEC)	<p>No antibiotics recommended.</p>	<p>Antibiotics may be indicated for severe diarrhea with no alternative explanation, however other etiologies should be investigated before pursuing treatment.</p> <p>Preferred:</p> <p>Azithromycin 10 mg/kg/DOSE PO daily (max: 500 mg/DOSE)</p> <p>Alternative, if macrolide allergy:</p> <p>Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/dose)</p>	<p>Duration:</p> <ul style="list-style-type: none"> Azithromycin: 3 days Ciprofloxacin: 3-5 days <p>Pediatric Infectious Diseases consult is recommended for patients with bacteremia or evidence of invasive infection.</p> <p>Can be a cause of traveler's diarrhea, typically at time of international travel. However, GI panel has potential for cross reactivity with normal GI flora. In addition, asymptomatic carriage may occur.</p>

Pathogen/ Infectious Agent	Outpatient Management	Inpatient Management	Comments
Enteroaggregative <i>E. coli</i> (EAEC)	<p><u>Uncomplicated:</u></p> <ul style="list-style-type: none"> - No antibiotics recommended unless indications present <p><u>Indications for further evaluation/antibiotics:</u></p> <ul style="list-style-type: none"> - Immunocompromised - Severe or prolonged infection <p><u>Preferred:</u></p> <p>Azithromycin 10 mg/kg/DOSE PO daily (max: 500 mg/DOSE)</p> <p><u>Alternative, if macrolide allergy:</u></p> <p>Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/dose)</p>		<p><u>Duration:</u></p> <ul style="list-style-type: none"> - Azithromycin: 3 days - Ciprofloxacin: 3-5 days <p>Pediatric Infectious Diseases consult is recommended for patients with bacteremia or evidence of invasive infection.</p> <p>EAEC is associated with both traveler's and non-traveler's diarrhea. May cause prolonged (> 14 days) symptoms.</p> <p>EAEC has been associated with outbreaks at daycares.</p>
<i>Plesiomonas shigelloides</i>	<p><u>Uncomplicated:</u></p> <ul style="list-style-type: none"> - No antibiotics recommended unless indications present <p><u>Indications for further evaluation/antibiotics:</u></p> <ul style="list-style-type: none"> - Immunocompromised - Infants < 3 months - Severe or prolonged infection <p><u>Preferred:</u></p> <p>Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/DOSE)</p>	<p><u>Uncomplicated</u></p> <p><u>Preferred:</u></p> <p>Ciprofloxacin* 15 mg/kg/DOSE PO BID (max: 500 mg/DOSE)</p> <p><u>If severe disease, concern for bacteremia or invasive disease</u></p> <p><u>Preferred, pending blood culture results:</u></p> <p>Meropenem* 20 mg/kg/DOSE IV q8h (max: 1 g/DOSE)</p>	<p><u>Duration:</u></p> <ul style="list-style-type: none"> - Ciprofloxacin: 3-5 days - Bacteremia/invasive disease: 7-14 days in conjunction with ID consult <p>Susceptibility testing is recommended for bacteremia or invasive disease. Step down to narrower agents once susceptibilities have returned.</p> <p>There are case reports of patients with extraintestinal infections (bacteremia, skin infections, eye infections, etc.), typically patients who are immunocompromised, neonates, or with hepatobiliary disorders.</p>
<i>Clostridioides</i> (formerly <i>Clostridium</i>) <i>difficile</i>	Please refer to separate guideline for evaluation and management of <i>C. difficile</i> infection: Clostridioides difficile Infection in Adults and Children		
Parasites			
<i>Giardia intestinalis</i>	<p>Some infections are self-limited and do not require treatment. Treatment may be indicated for severe illness and patients with immunocompromise.</p> <p><u>Preferred for patients ≥ 3 years of age:</u></p> <p>Tinidazole 50 mg/kg/DOSE PO once (max: 2 g/DOSE)</p> <p><u>Alternative for patients < 3 years of age:</u></p> <p>Metronidazole 10 mg/kg/DOSE PO TID (max: 500 mg/DOSE)</p> <p><u>Additional alternative for patients >1 year of age:</u></p> <p>Nitazoxanide</p> <ul style="list-style-type: none"> • < 1 year: not recommended • 1-3 years: 100 mg/DOSE PO BID • 4-11 years: 200 mg/DOSE PO BID • ≥ 12 years: 500 mg/DOSE PO BID 		<p><u>Duration:</u></p> <ul style="list-style-type: none"> - Tinidazole: 1 dose - Metronidazole: 5 days - Nitazoxanide: 3 days <p>About 10-20% of <i>Giardia</i> infections are refractory, so if persistent diarrhea and positive test results, recommend referral or consult to Pediatric Infectious Diseases.</p> <p>Acquired lactose intolerance can occur in up to 40% of patients.</p>

Pathogen/ Infectious Agent	Outpatient Management	Inpatient Management	Comments
<i>Cryptosporidium</i>	<p>Immunocompetent hosts typically can receive supportive care alone. Treatment may be indicated for severe illness and patients with immunocompromise.</p> <p>Preferred Nitazoxanide</p> <ul style="list-style-type: none"> - < 1 year: not recommended - 1-3 years: 100 mg/DOSE PO BID - 4-11 years: 200 mg/DOSE PO BID - ≥ 12 years: 500 mg/DOSE PO BID 		<p>Duration:</p> <ul style="list-style-type: none"> - Immunocompetent: 3 days - Immunocompromised: 14 days <p>Treatment failures can occur. In these cases, recommend discussion with Pediatric Infectious Diseases.</p> <p>For immunocompromised hosts, discuss reduction of immunosuppression, if possible.</p>
<i>Cyclospora</i>	<p>Antibiotics recommended for <u>ALL</u> patients with <i>Cyclospora</i>.</p> <p>Preferred: TMP-SMX* 4 mg/kg/DOSE PO BID (max: 320 mg/DOSE)</p>		<p>Duration:</p> <ul style="list-style-type: none"> - 7 days; immunocompromised patients may need longer courses of therapy; recommend discussion with Pediatric Infectious Diseases <p>No highly effective alternatives have been identified for people who are unable to tolerate TMP-SMX.</p>
<i>Entamoeba histolytica</i>	<p>Antimicrobials recommended for <u>ALL</u> patients with <i>E. histolytica</i>.</p> <p><i>Symptomatic disease</i> – requires initial course <i>followed by</i> an intraluminal agent <i>Asymptomatic disease</i> – requires only intraluminal agent</p> <p><u>Initial course for symptomatic patients (must be followed by intraluminal course):</u> Preferred: Metronidazole 13 mg/kg/DOSE PO TID</p> <p>Alternative: Tinidazole 50 mg/kg/DOSE PO daily (max: 2 g/DOSE)</p> <p><u>Intraluminal agents for continuation therapy in symptomatic patients or sole therapy for asymptomatic patients:</u> Preferred: Paromomycin 10 mg/kg/DOSE PO TID</p>		<p>Duration:</p> <ul style="list-style-type: none"> - Initial course: <ul style="list-style-type: none"> o Metronidazole: 7-10 days o Tinidazole: 3-5 days - Intraluminal agents: <ul style="list-style-type: none"> o Paromomycin: 7 days <p>Pediatric Infectious Diseases consult is recommended for symptomatic patients, or if evidence of invasive infection.</p> <p><i>E. histolytica</i> has a broad spectrum of illness including asymptomatic carriage, subacute or chronic diarrhea, dysentery, or fulminant colitis, as well as numerous extra-intestinal manifestations including liver abscesses.</p> <p>Treatment for symptomatic patients should include antimicrobials to eliminate invading trophozoites (metronidazole or tinidazole), followed by treatment of organisms carried in the intestinal lumen (paromomycin).</p>
Viruses			
Adenovirus, Rotavirus, Norovirus, Astrovirus, Sapovirus, etc.	<p>Supportive care is recommended.</p> <p>Consider Pediatric ID consult to discuss potential treatment options for prolonged norovirus in immunocompromised/transplant patients.</p> <p>Otherwise, antimicrobials are not indicated for viral infections.</p>		<p>If concern for prolonged diarrhea in immunocompromised patients or viruses other than those on GI panel - CMV, for instance – consider Pediatric Infectious Diseases consult.</p>

* Renal adjustment may be necessary. See [Antimicrobial Dosing Recommendations for Pediatric Patients](#).



Authors:

Elizabeth Lloyd (Pediatric Infectious Diseases and Antimicrobial Stewardship)
Nicholas Dillman (Pharmacy and Antimicrobial Stewardship)

Consultants:

Alison Tribble (Pediatric Infectious Diseases and Antimicrobial Stewardship)
Kristin Klein (Pharmacy and Antimicrobial Stewardship)
Karen Davidge (Pharmacy and Antimicrobial Stewardship)
Kim Monroe (Pediatric Hospitalist)
Elise Gross (Pediatric Hospitalist)
Julia Madison-Williams (General Pediatrics)
Marisa Louie (Pediatric Emergency Medicine)

Sources:

1. Harriet Lane Service (Johns Hopkins Hospital), Helen Hughes, and Lauren Kahl. The Harriet Lane Handbook: A Manual for Pediatric House Officers. Twenty-first edition. Philadelphia, PA: Elsevier, 2018.
2. Kimberlin, David W, Michael T. Brady, Mary A. Jackson, and Sarah S. Long. Red Book: 2018-2021 Report of the Committee on Infectious Diseases. 2018.
3. Centers for Disease Control (CDC): <https://www.cdc.gov/>
4. Shane AL et al. 2017 Infectious Diseases Society of America clinical practice guidelines for the diagnosis and management of infectious diarrhea. Clin Infect Dis. 2017 Nov 29; 65(12):1963-73. doi: 10.1093/cid/cix959.
5. Goldstein B, Giroir B, Randolph A, International Consensus Conference on Pediatric Sepsis. Pediatr Crit Care Med. 2005 Jan; 6(1):2-8.
6. Granado-Villar D, Cunill-De Sautu B, Granados A. Acute gastroenteritis. Pediatr Rev. 2012 Nov;33(11):487-94. doi: 10.1542/pir.33-11-487. PMID: 23118314.
7. Guarino A, Lo Vecchio A, Dias JA, et al. Universal Recommendations for the Management of Acute Diarrhea in Nonmalnourished Children. Journal of pediatric gastroenterology and nutrition vol 67,5 (2018): 586-593. Doi:10.1097/MPG.0000000000002053
8. Van Niel, Cornelius W et al. "Lactobacillus therapy for acute infectious diarrhea in children: a meta-analysis." Pediatrics vol. 109,4 (2002): 678-84. doi:10.1542/peds.109.4.678

Antimicrobial Subcommittee Approval: 02/24	Originated: 04/21
P&T Approval: 03/24	Last Revised: 02/24
Revision History:	

The recommendations in this guide are meant to serve as treatment guidelines for use at Michigan Medicine facilities. If you are an individual experiencing a medical emergency, call 911 immediately. These guidelines should not replace a provider's professional medical advice based on clinical judgment, or be used in lieu of an Infectious Diseases consultation when necessary. As a result of ongoing research, practice guidelines may from time to time change. The authors of these guidelines have made all attempts to ensure the accuracy based on current information, however, due to ongoing research, users of these guidelines are strongly encouraged to confirm the information contained within them through an independent source.

If obtained from a source other than <https://www.med.umich.edu/asp/>, please visit the webpage for the most up-to-date document.